

FIG. 1

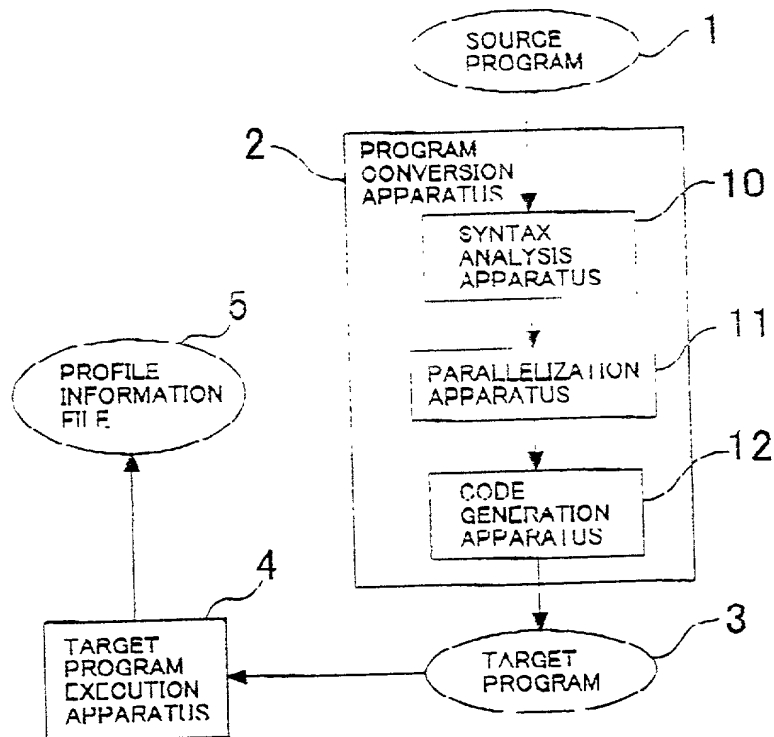


FIG. 2

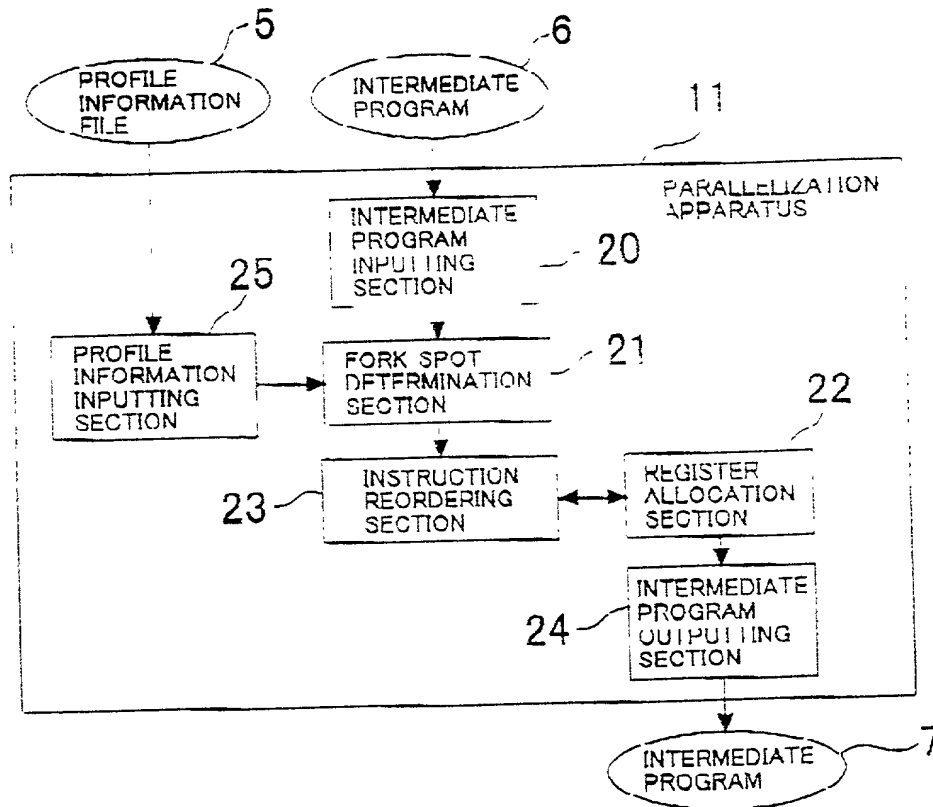


FIG. 3

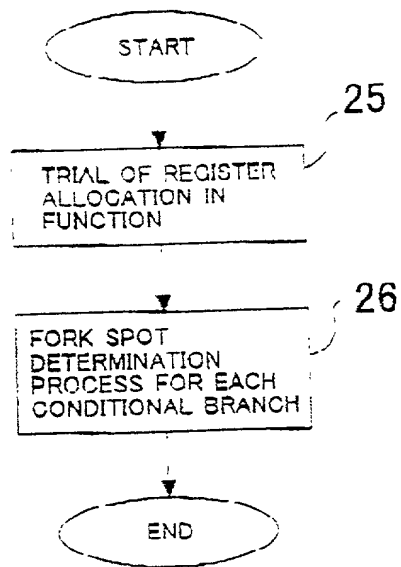


FIG. 4

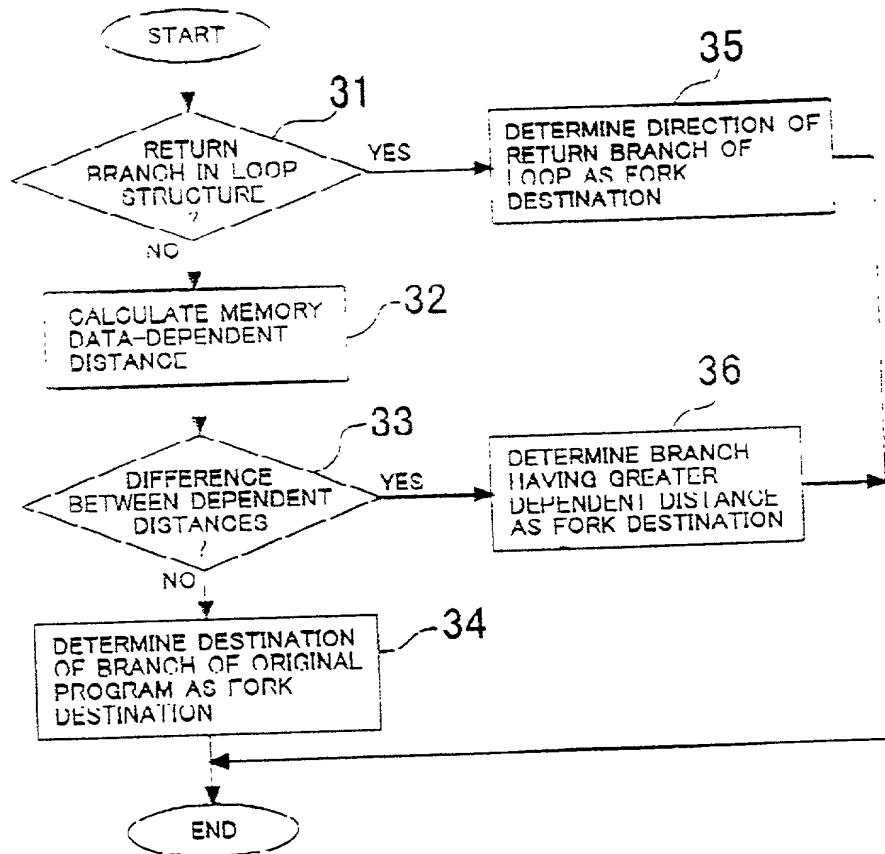


FIG. 5

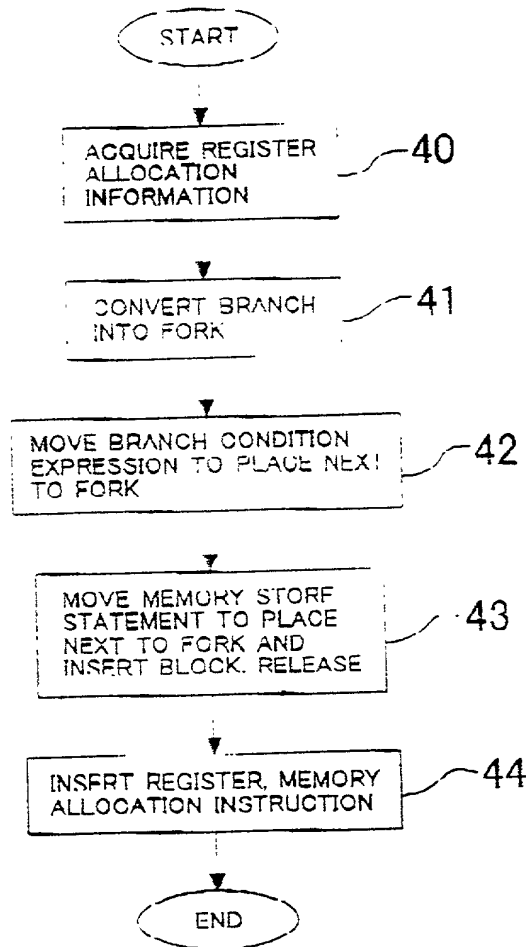


FIG. 6(A)

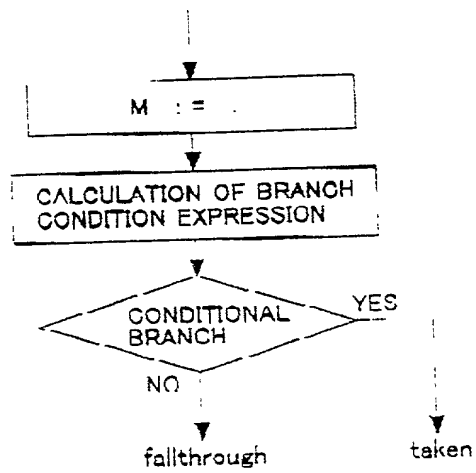


FIG. 6(B)

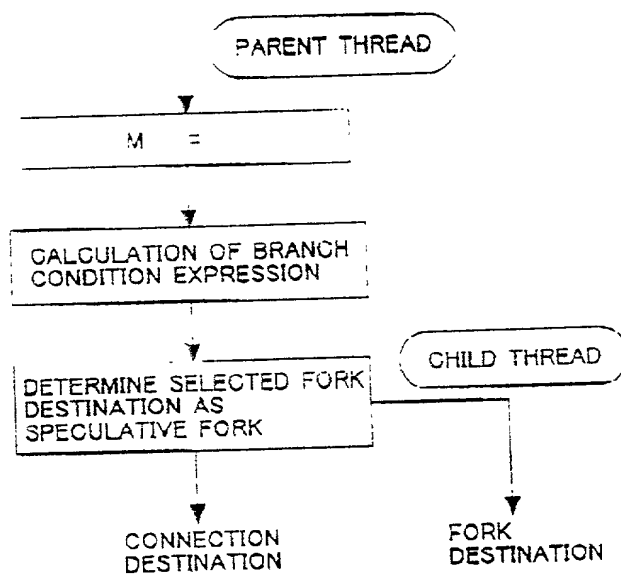


FIG. 6(D)

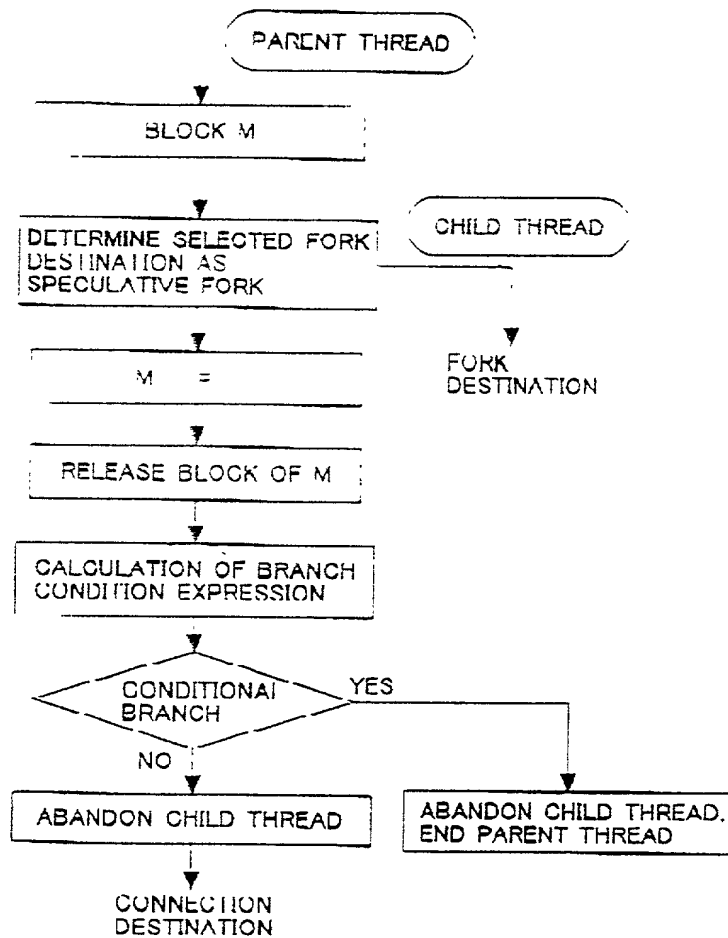


FIG. 6(D)

FIG. 6(E)

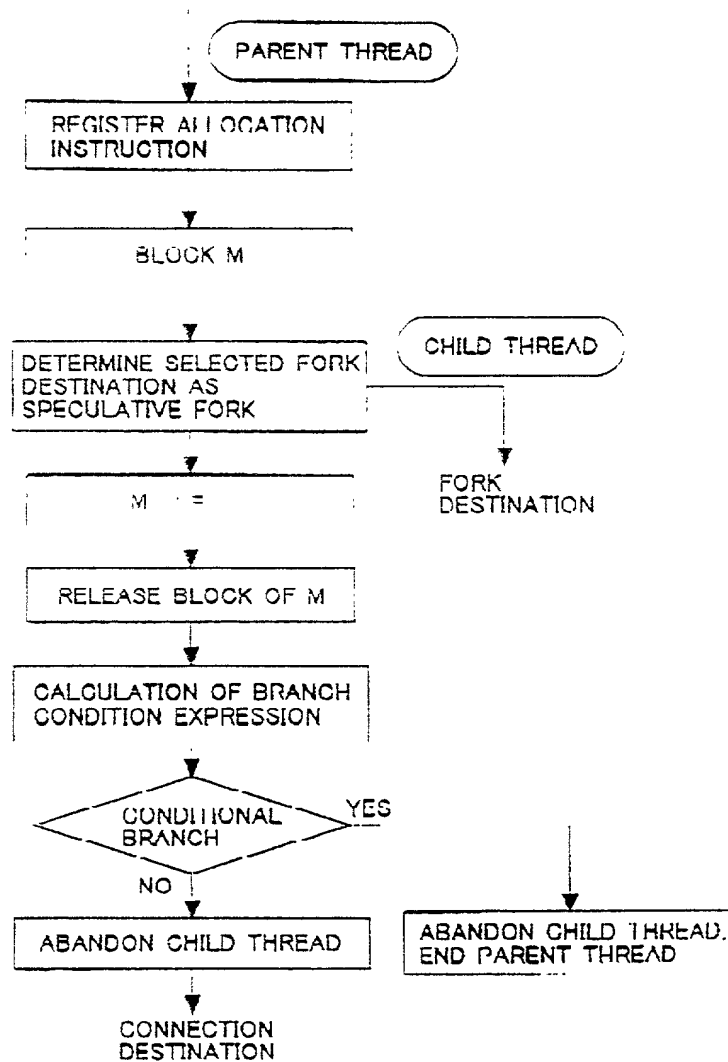


FIG. 7

SPFORK 1	TO CREATE A SPECULATION MODE CHILD THREAD FOR STARTING EXECUTION FROM 1
TTERM c	TO END SELF THREAD AND SETTLE CHILD THREAD IF c IS TRUE
FTERM c	TO END SELF THREAD AND SETTLE CHILD THREAD IF c IS FALSE
THABORT	TO ABANDON A CHILD THREAD OF A SPECULATION MODE
BLACK m	TO DESIGNATE A MEMORY ADDRESS DESIGNATED WITH M AS BLOCK
RELEASE m	TO CLEAR BLOCK SET TO MEMORY ADDRESS DESIGNATED WITH M
DSPIN	TO CREATE A CHILD THREAD CREATED BY SUCCEEDING FORK IN DATA-DEPENDENT SPECULATION MODE
DSPOUT	TO CLEAR DATA-DEPENDENT SPECULATION MODE OF CHILD THREAD
RDCL t,...	TO INSTRUCT TO ALLOCATE INTERMEDIATE TERMS/VARIABLES DESIGNATED WITH t, ... TO REGISTER
MDCL t,...	TO INSTRUCT TO ALLOCATE INTERMEDIATE TERMS/VARIABLES DESIGNATED WITH t, ... TO MEMORY

FIG. 8

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( 1)  t1 := &X
( 2)  t2 := 1
( 3)  t3 := 4
( 4)  t4 := t2 * t3
( 5)  t5 := t1 + t4
( 6)  t6 := 1
( 7)  mem(t5) = t6
( 8)  t7 := 1
( 9)  t8 := 20
(10)  t9 := t7 > t8
(11)  if false then goto L2
(12)  L1:
(13)  t10 := &X
(14)  t11 := 0
(15)  t12 := 4
(16)  t13 := t11 * t12
(17)  t14 := t10 + t13
(18)  t15 := mem(t14)
(19)  t16 := J
(20)  t17 := t15 - t16
(21)  R := t17
(22)  goto L3
(23)  L2:
(24)  t18 := K
(25)  t19 := 10
(26)  t20 := t18 / t19
(27)  R := t20
(28)  t21 := &X
(29)  t22 := J
(30)  t23 := 4
(31)  t24 := t22 * t23
(32)  t25 := t21 + t24
(33)  t26 := mem(t25)
(34)  t27 := R
(35)  t28 := t26 + t27
(36)  R := t28
(37)  L3:

```

(B1)

(B2)

(D3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2	2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
3	3	2	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
4	4	3	2	1	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
5	5	4	3	2	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																				

```

(51) t1 := &X
(52) t2 := I
(53) t3 := 4
(54) t4 := t2 + t3
(55) t5 := t1 + t4
(56) t6 := 1
(57) mem(t5) := t6
(58) SPORK L2
(59) t7 := I
(60) t8 := 20
(61) t9 := t7 > t8
(62) FTERM
(63) IABORT
(64) goto L1
(65) L1:
(66) t10 := &X
(67) t11 := J
(68) t12 := 4
(69) t13 := t11 * t12
(70) t14 := t10 + t13
(71) t15 := mem(t14)
(72) t16 := J
(73) t17 := t15 + t16
(74) R := t17
(75) goto L3
(76) L2:
(77) t18 := K
(78) t19 := 10
(79) t20 := t18 / t19
(80) R := L20
(81) t21 := &X
(82) t22 := J
(83) t23 := 4
(84) t24 := t22 * t23
(85) t25 := t21 + t24
(86) t26 := mem(t25)
(87) t27 := R
(88) t28 := t26 + t27
(89) R := t28
(90) L3:

```

FIG. 10

```

(101)  t1 := &X
(102)  t2 := 1
(103)  t3 := 4
(104)  t4 := t2 * t3
(105)  t5 := t1 + t4
(106)  BLOCK t5
(107)  SPFORK L2
(108)  t6 := 1
(109)  mem(t5) := t6
(110)  RELEASE t5
(111)  t7 := 1
(112)  t8 := 20
(113)  t9 := t7 > t8
(114)  FTERM
(115)  THABORT
(116)  goto L1
(117)  L1:
(118)  t10 := &X
(119)  t11 := J
(120)  t12 := 4
(121)  t13 := t11 * t12
(122)  t14 := t10 + t13
(123)  t15 := mem(t14)
(124)  t16 := J
(125)  t17 := t15 + t16
(126)  R := t17
(127)  goto L3
(128)  L2:
(129)  t18 := K
(130)  t19 := 10
(131)  t20 := t18 / t19
(132)  R := t20
(133)  t21 := &X
(134)  t22 := J
(135)  t23 := 4
(136)  t24 := t22 * t23
(137)  t25 := t21 + t24
(138)  t26 := mem(t25)
(139)  t27 := R
(140)  t28 := t26 + t27
(141)  R := t28
(142)  L3:

```

(B1)

(B2)

(B3)

FIG. 11

```

(201) RDCL t1 - t9
(202) RDCL I
(203) MDCL X
(204) t1 := &X
(205) t2 := I
(206) t3 := 4
(207) t4 := t2 * t3
(208) t5 := t1 + t4
(209) BLOCK t5
(210) SPFORK L2
(211) t6 := 1
(212) mem(t5) = t6
(213) RELEASE t5
(214) t7 := 1
(215) t8 := 20
(216) t9 := -7 > t8
(217) FTERM
(218) THABORT
(219) goto L1
(220) L1:
(221) RDCL t10 - t17
(222) RDCL R
(223) MDCL X, J
(224) t10 := &X
(225) t11 := J
(226) t12 := 4
(227) t13 := t11 * t12
(228) t14 := t10 + t13
(229) t15 := mem(t14)
(230) t16 := J
(231) t17 := t15 + t16
(232) R := t17
(233) goto L3
(234) L2:
(235) RDCL t18 - t28
(236) RDCL R
(237) MDCL X, J
(238) t18 := K
(239) t19 := 10
(240) t20 := t18 / t19
(241) R := t20
(242) t21 := &X
(243) t22 := J
(244) t23 := 4
(245) t24 := t22 * t23
(246) t25 := t21 + t24
(247) t26 := mem(t25)
(248) t27 := R
(249) t28 := t26 + t27
(250) R := t28
(251) L3:

```

(B1)

(B2)

(R3)

FIG. 12

```

(255) r21 := &X
(256) r22 := r11
(257) r23 := 4
(258) r24 := r22 * r23
(259) r25 := r21 + r24
(260) BLOCK r25
(261) SPFORK L2
(262) r26 := 1
(263) mem(r25) := r26
(264) RELEASE r25
(265) r27 := r11
(266) r28 := 20
(267) r29 := r27 / r28
(268) FTERM r29
(269) THABORT
(270) goto L1
(271) L1:
(272) r20 := &X
(273) r21 := mem(&J)
(274) r22 := 4
(275) r23 := r21 * r22
(276) r24 := r20 + r23
(277) r25 := mem(r24)
(278) r26 := mem(&J)
(279) r27 := r25 + r26
(280) r12 := r27
(281) goto L3
(282) L2:
(283) r20 := r13
(284) r21 := 10
(285) r22 := r20 / r21
(286) r12 := r22
(287) r23 := &X
(288) r24 := mem(&J)
(289) r25 := 1
(290) r26 := r24 * r25
(291) r27 := r23 + r26
(292) r28 := mem(r27)
(293) r29 := r12
(294) r30 := r28 + r29
(295) r12 := r30
(296) L3:

```


FIG. 13

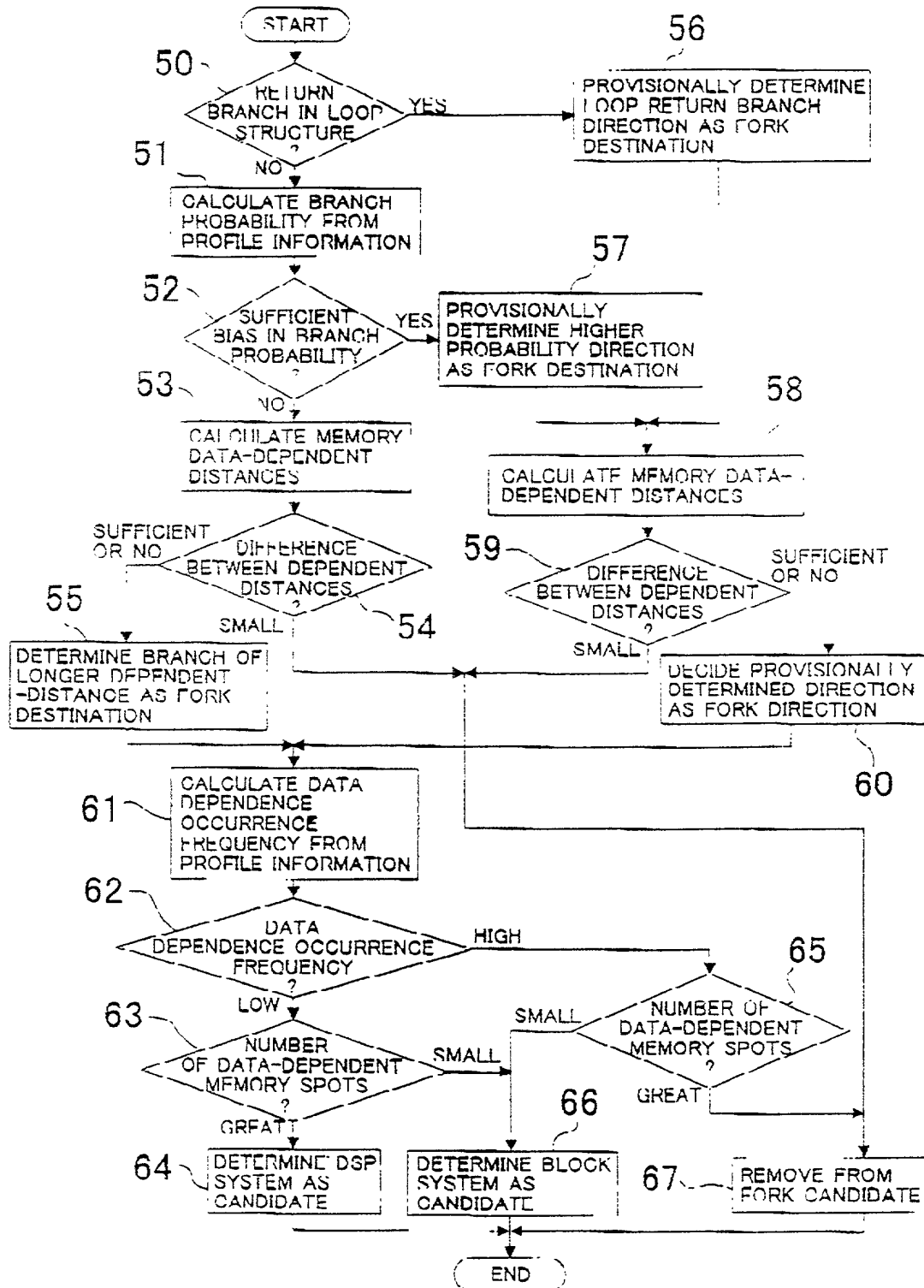


FIG. 14

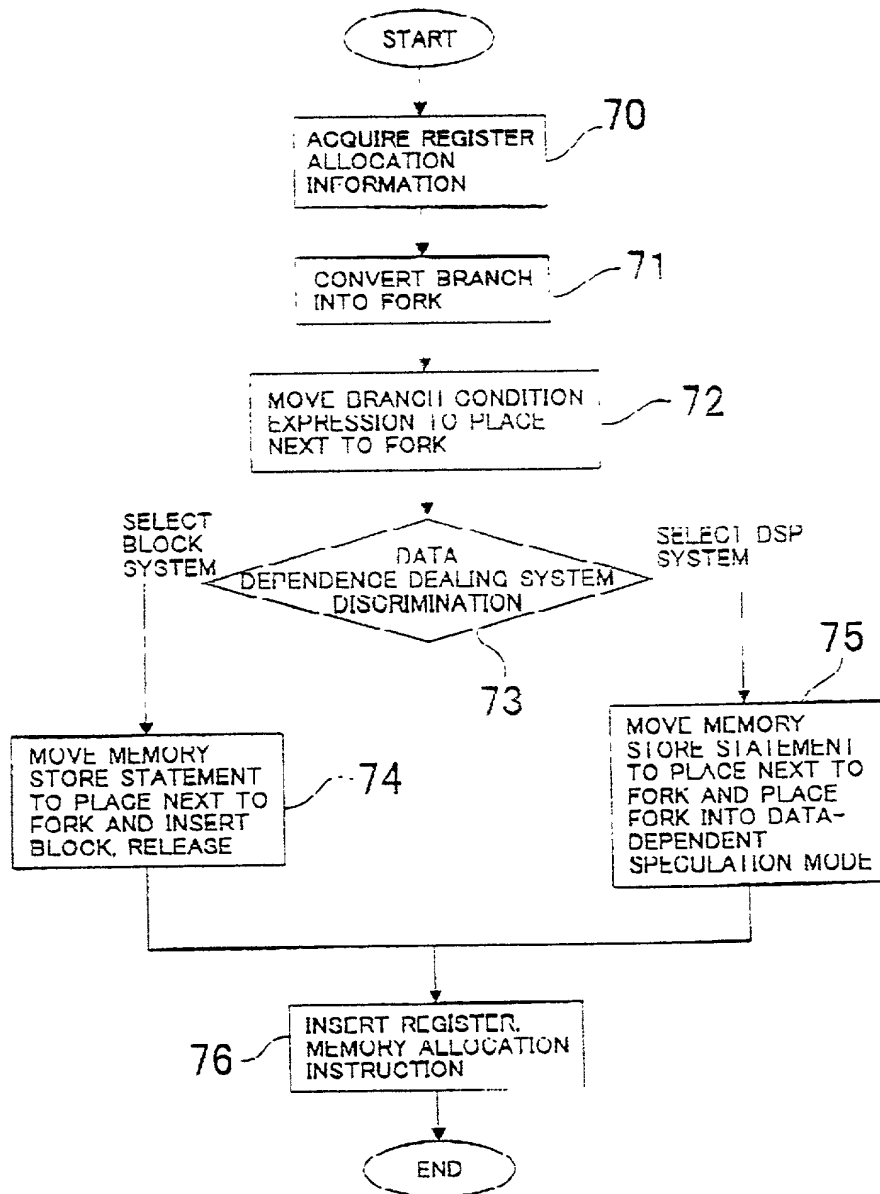


FIG. 14

[illegible]

(R11)

(B12)

(R13)

(B14)

(B15)

(B16)

(B17)

FIG. 16(A)

BRANCHING NUMBER		
R 11	R 12: 2D	R 13: 18D
R 13	R 14: 3D	R 15: 17D
B 15	B 16: 3D	B 17: 17D

FIG. 16(B)

MEMORY DATA DEPENDENCE

B 15 → B 16	12D
B 15 → R 17	4

FIG. 17

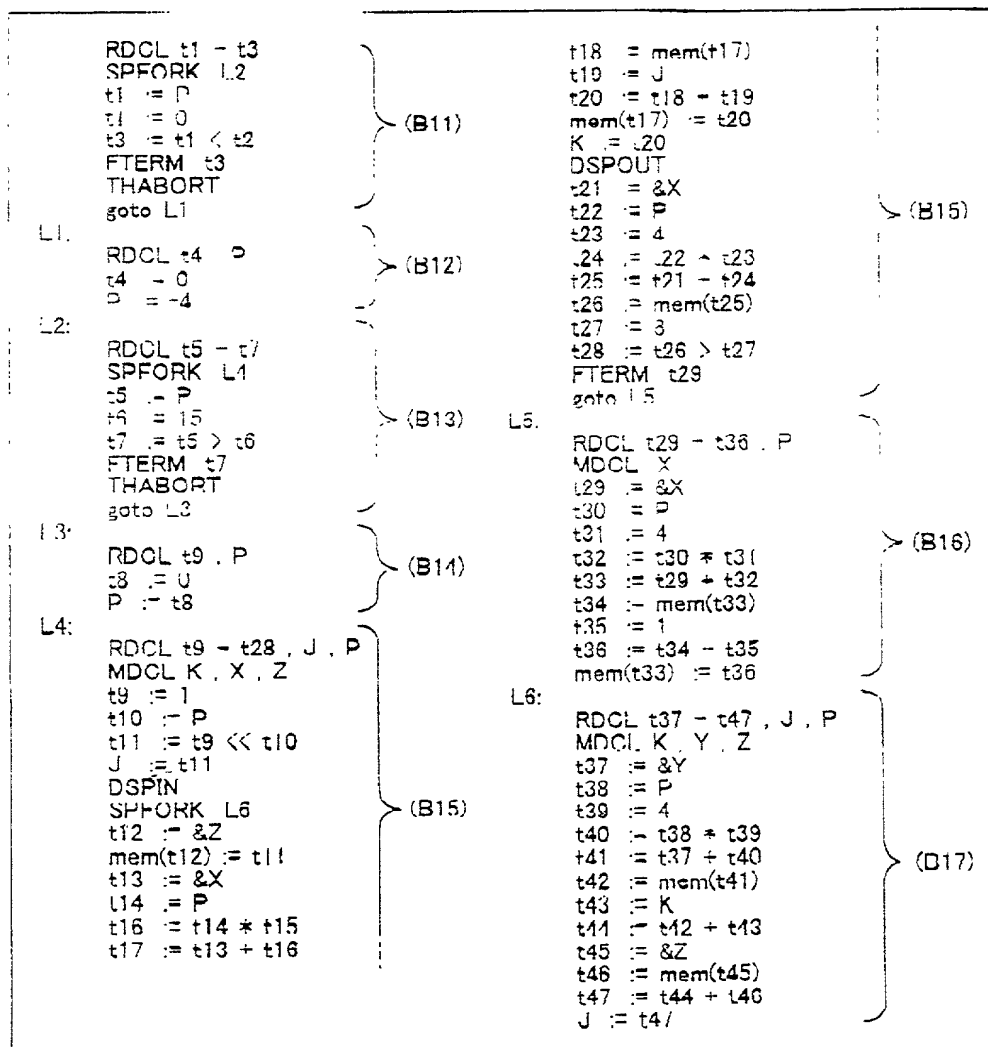


FIG. 18

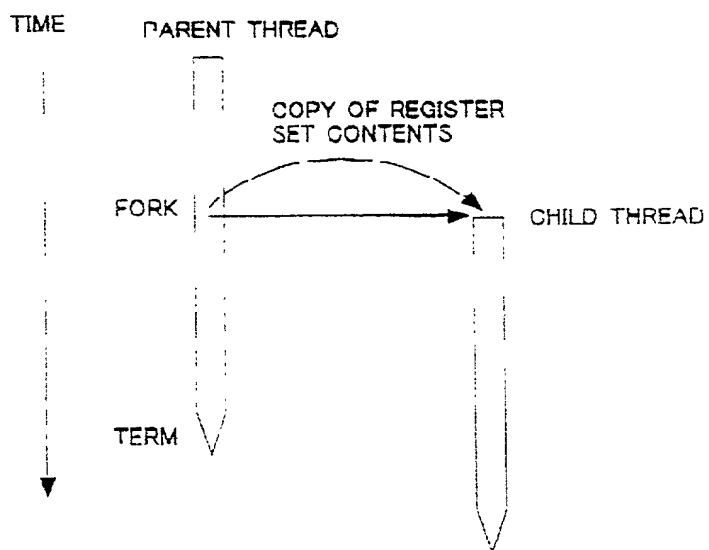


FIG. 19

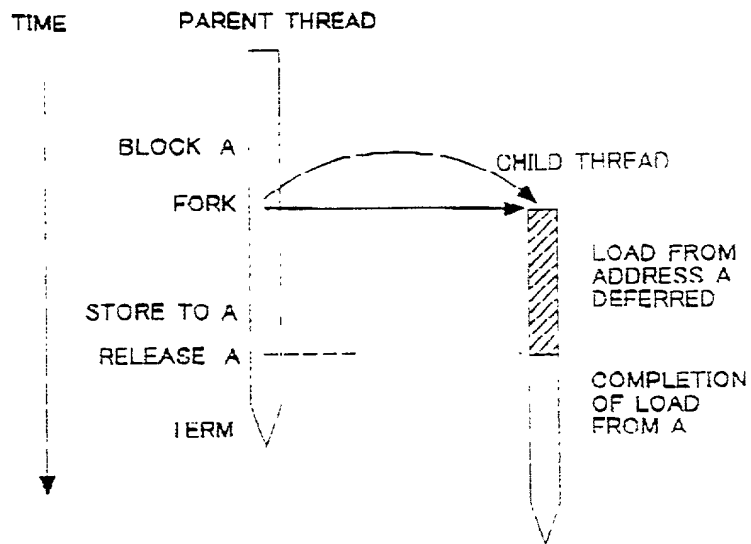


FIG. 20(A)

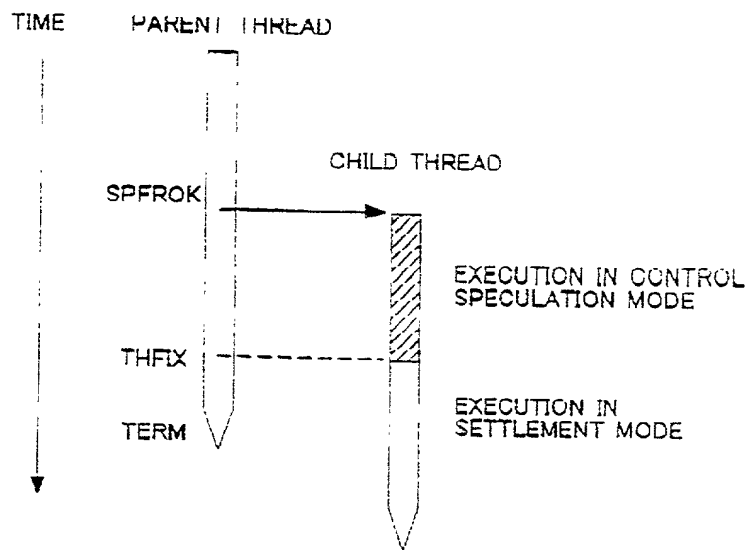


FIG. 20(B)

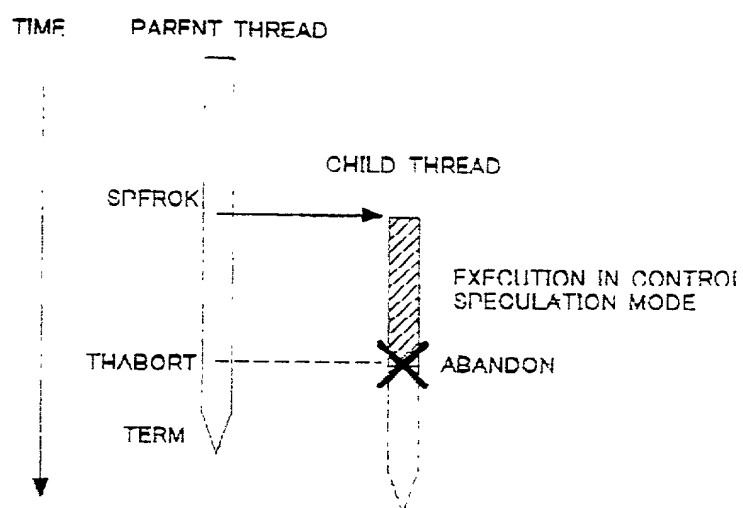


FIG. 21

